

# Operating Manual

**APOLLO<sup>®</sup> 50 - 1,3 bar**

**APOLLO<sup>®</sup> 100 - 1,3 bar**

**APOLLO<sup>®</sup> 150 - 1,3 bar**





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**Appendix:**    name plate  
                      Certificate/Declaration of Conformity  
                      List of pressure device and equipment

## **1 Introduction**

The APOLLO® Vessel is a vacuum super insulated pressure vessel made of corrosion-resistant stainless steel. It is intended exclusively for storing nitrogen (cryogenic liquid nitrogen).

The APOLLO® Vessel acc. to Directive for Pressure Devices 97/23/EG

Category I Module A., with CE - marking

### **1.1 Symbols in the Manual**



**This sign points out to dangerous situations resulting in possible**

- injury to persons
- damage to the environment
- damage to devices



**This sign refers to**

- recommendations
- explanations
- supplements

### **1.2 Principle**

**The APOLLO® Vessel may only be operated according to this operating manual.**

### **1.3 Delivery**

**Immediately after receipt of the vessel, the delivery has to be examined with regard to**

- completeness
- damage



**In case of any shipping damage, contact**

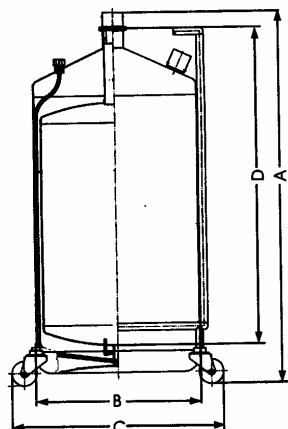
- the shipping insurance
- the shipping company
- the supplier

## 2 Vessel

### 2.1 Main Components

- Coaxial arrangement of the pressure vessel in the outer vessel with neck suspension and vacuum super insulation
- Pressure build-up device arranged in the vacuum room
- Chassis
- Safety valve
- Pressure gauge
- Dismountable siphon, Type **EK**<sup>®</sup>

### 2.2 Specifications of the Vessel



Manufacturer		Cryotherm GmbH & Co. KG		
Type		APOLLO <sup>®</sup> 50 - 1,3 bar	APOLLO <sup>®</sup> 100 -1,3 bar	APOLLO <sup>®</sup> 150 -1,3 bar
Total height, cm	A	80	114	146
Outside diameter, cm	B	50	50	50
Total width, cm	C	76	76	76
Immersion depth, cm	D	58,5	92	122
Neck diameter, mm		50	50	50
Weight empty, kg		44	62	79
Weight full, kg		85	145	204
Geometrical capacity, l		49,5	99,2	149,5
Static rate of evaporation, % / day		2	1,2	1
Operating pressure, bar max.		1,3	1,3	1,3

### 2.3 Specifications of the Safety Valve

Type	06002
Blow-off pressure	1,3 bar

## 2.4 Examination of Safety Valve

### Examination

Seat tightness and set pressure of the safety valve may only be examined by means of the bubble method outlined below. Contamination and corrosion of the valve mechanics are thus avoided. The set pressure is indicated on the type plate of the safety valve.

#### 1. Admission of Test Pressure

For the admission of the test pressure, a suitable testing device has to be used. With safety valves which shall not be dismantled, the test may be executed by the vessel pressure. Do not carry out examinations with oxygen or combustible as well as corrosive gases.

#### 2. Examination of Seat Tightness

Increase the test pressure to 90 % of the set pressure. The valve has to remain tight.

#### 3. Examination of Set Pressure

Slowly increase the test pressure to 100 %. The safety valve will blow off.

The set pressure may deviate from the nominal value +/- 10%.



**Full-flow safety valves do open abruptly! Possibly, set pressure and opening pressure are identical.**

## 2.5 Assembly of Safety Valve

Wrap PTFE – tape on the R1/4“ connection and screw it tight in the connection thread.



**Caution!** Be careful, that no parts of PTFE peel away into the medium tube, which will cause malfunction of the safety valve

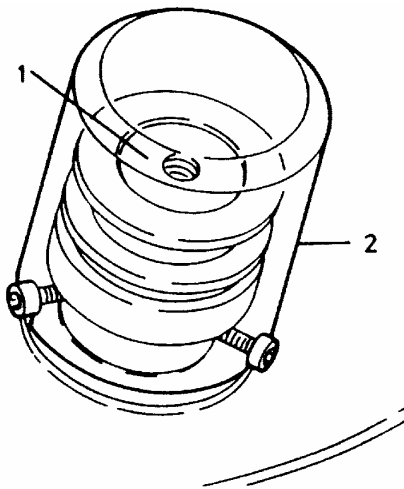
## 2.6 Wrong Installation / Operating Errors



**The application of the following means and tools to the safety valve are prohibited:**

- pliers
- striking tools
- lubricating spray
- hemp
- open flame
- vapour
- leak indicating spray
- lees

## 2.7 Combined Positive Pressure Relief and Seal-off Device



**Caution!** The positive pressure relief and seal-off device protects the vacuum room from overpressure. Re-evacuation may only be carried out by

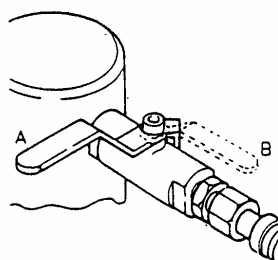
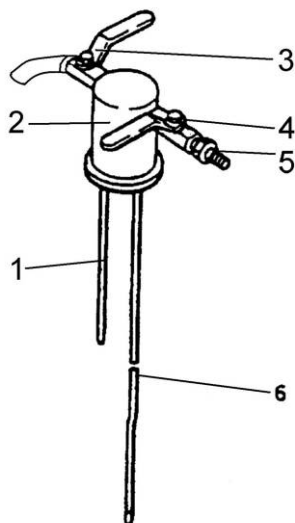
- manufacturer's skilled staff



The protective cover (2) intercepts the valve insert (1), when there is overpressure existing in the vacuum room.

- Do not remove the protective cover (2).
- Protect the valve from heat as well as cooling, as brittleness results in the loss of the operating vacuum.

## 2.8 Siphon with Small Flange Connection Type EK



### Structure of the Siphon

Item	Description
1	Waste gas/overflow line
2	Basic body with small flange connection DN 50
3	Waste gas/overflow valve G 1/2"
4	Filling/withdrawal valve G 3/8"
5	Connection screwing (double nipple ring R 3/8" - 3/4-16 UNF) for flexible transfer hose
6	Filling/withdrawal line

The siphon serves for the filling and withdrawal of liquid nitrogen.

Special designs (e.g. single / triple withdrawal) are available on request.

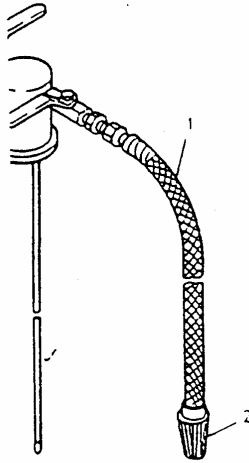
### Ball Valve Positions:

A - closed

B - open



## 2.9 Transfer Hose



### Structure of the Standard Transfer Hose

Item	Description
1	Flexible corrugated hose with a corrosion-resistant stainless steel braiding
2	Phase separator for ensuring the splash-free transfer of liquid nitrogen



#### Exchange damaged hose



#### Protect transfer hose from

- bending when in a cold condition
- being twisted
- being pulled
- buckling
- impacts

## 2.10 Level Indicator

### Structure of the Level Indicator



### Determination of the Vessel Filling Level

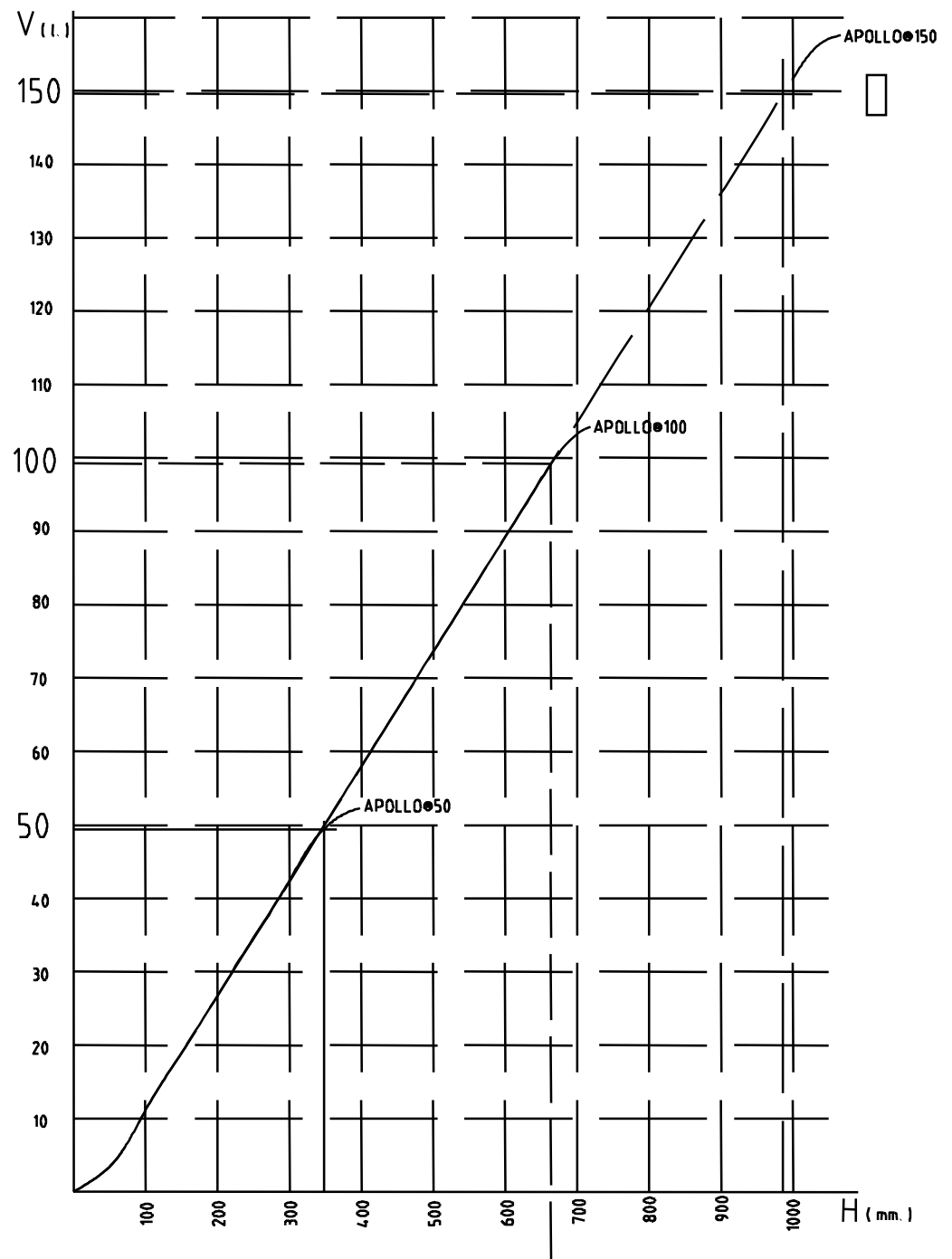
- by reading the scale of the level indicator
- by determining the filling level by means of a dip rod and comparing with the filling level curve
- the black area marks 25% of residual contents



### Prior to the disassembly of the level indicator:

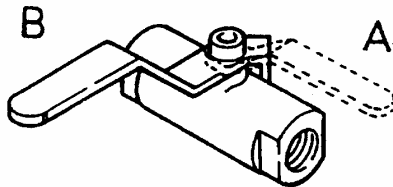
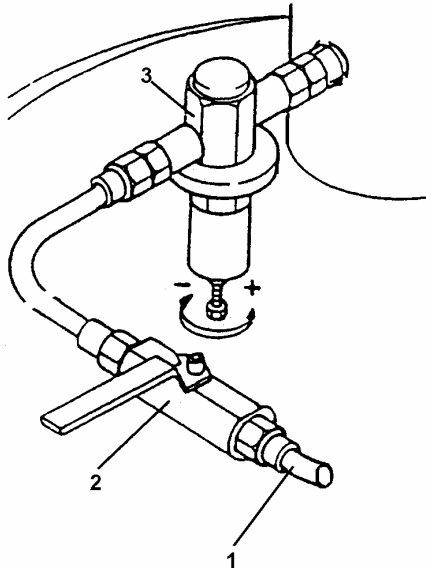
- relieve pressure from the vessel
- close the shut-off valve (2)

**APOLLO<sup>®</sup> 50, 100, 150 Filling  
Level Curve**



drawing 78202700

## 2.11 Pressure Build-up Control System



### Automatic Pressure Build-up Control System (Option)

Item	Description
1	Pressure build-up line
2	Pressure build-up valve
3	Pressure build-up control valve

The automatic pressure build-up valve controls the pressure in the vessel.

It is recommended with continuous withdrawal operation.



**Close the pressure build-up valve (2) prior to filling, relieving pressure or transporting.**

#### Pressure Build-up Control

- Switch on by opening the pressure build-up valve (2), Position A.
- Switch off by closing the pressure build-up valve (2), Position B.

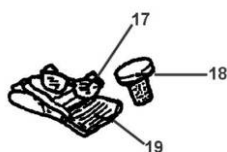
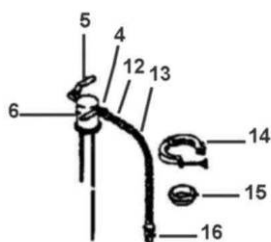
#### Changing the Operating Pressure

- Turning the regulating screw of the pressure build-up valve in clockwise direction causes the pressure to increase.
- Turning the regulating screw of the pressure build-up valve in counter clockwise direction causes the pressure to decrease.

#### Automatic Pressure Build-up Control Valve Mode of Operation:

- The pressure build-up control valve (3) will open when the pressure in the tank drops.
- The liquid nitrogen is introduced into the pressure build-up line (1) at the vessel bottom, it evaporates and is returned to the tank.
- The pressure in the tank rises to the adjusted operating pressure.
- The pressure build-up control valve (3) closes.

## 2.12 Spare Parts / Accessories



Item	Designation	Subject number	Subject number	Subject Number
		APOLLO® 50 – 1,3 bar 78202700	APOLLO® 100 – 1,3 bar 78202701	APOLLO® 150 – 1,3 bar 78202702
1	Lettering APOLLO	77031445	77031445	77031445
2	Cryotherm logo	79406985	79406985	79406985
3	Level Indicator MGI - WIKA	78202720	78202720	78202720
4	Ball valve 3/8"	0346570	0346570	0346570
5	Ball valve 1/2"	0793058	0793058	0793058
6	EK Siphon, complete	78202711	78202712	78202713
7	Safety valve, 1.3 bar	78212669	78212669	78212669
8	Pressure gauge 0-2.5 bar	78202716	78202716	78202716
9	Chassis	78202740	78202741	78202742
10	Castor with locking lever	78210302	78210302	78210302
11	Castor without locking lever	78210301	78210301	78210301
12	Double nipple R 3/8"- 3/4-16 UNF	0793576	0793576	0793576
13	Transfer hose, 1.5 m	79229957	79229957	79229957
14	Straining ring, DN 50	0792277	0792277	0792277
15	Centering ring, DN 50 complete	0793045	0793045	0793045
	O-ring for KF 50 (separate)	0793060	0793060	0793060
16	Phase separator G 3/8" complete	79404217	79404217	79404217
17	Safety glasses	0794189	0794189	0794189
18	Transport stopper DN 50	78202417	78202417	78202417
19	Protective insulating leather gloves	0794111	0794111	0794111
20	Rating plate (adhesive film)	78201604	78201604	78201604
21	Operating instructions (adhesive film)	79406614	79406614	79406614
	Operating manual	78211688	78211688	78211688
22	GGVS / ADR - Labelling			
	Cryogenic liquid nitrogen	78400571	78400571	78400571
	GGVS adhesive label no. 2	0358193	0358193	0358193
	GGVS adhesive label ↑↑ no.11	0356199	0356199	0356199
23	Connection tube	78202718	78202718	
*	Option Instead of pos. 23 Pressure regulator	0366006	0366006	

### 3 Safety

#### 3.1 How to handle liquid Nitrogen



##### **Caution when handling liquid nitrogen!**

##### **Observe the following documents and procedures:**

- Leaflet „How to handle nitrogen“
- Safety data sheet: “Nitrogen refrigerated”
- Accident leaflet "cryogenic liquefied gases: suffocating“
- When setting up in rooms, ensure good ventilation (TRB 610)
- Operation may only be carried out by persons instructed correspondingly (TRB 700)
- Regulation for the Prevention of Accidents „gases“ BGV B 6 (VBG61)
- Regulation for Pressure Devices

#### 3.2 General Safety Instructions



##### **For safe operation:**

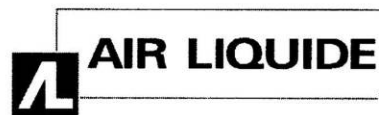
- Additional aggregates for filling/withdrawal have to be adjusted to the operating conditions of the tank.
- Test the tightness and function of the fittings at regular intervals.
- Use original spare parts.
- Employ suitable tools.
- Do not operate valves abruptly or jerkily.
- Protect lockable rooms from exceeding of the maximum operating overpressure by means of a safety valve.
- Have adjustment, maintenance and repair work done only by authorized skilled personnel.
- Do not carry out any mechanical and thermal work at the vessel (loss of vacuum).
- Do not transfuse contents with foreign gas.
- Do not overcharge the tank.
- Protect safety valves from splash water and lees.
- Wear gloves and safety glasses.
- Loosen the screwings only in unpressurized condition.

#### 3.3 Proper Use according to the Regulations

**Company Cryotherm GmbH & Co. KG does not assume any liability, if the tank is changed or adapted without approval given by the manufacturer.**

**Company Cryotherm GmbH & Co. KG does not assume any liability, if the tank is not properly used according to the regulations.**

### 3.4 Safety Data Sheet "Nitrogen refrigerated"



## Safety Data Sheet

<b>Product :</b>	<b>Nitrogen (refrigerated)</b>	<b>Page :1/4</b>
MSDS Nr : 089B_AL	Version : 1.01	Date : 31/07/2002

### 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

MSDS Nr	089B_AL
Product name	Nitrogen (refrigerated)
Chemical formula	N <sub>2</sub>
Company identification	see heading and/or footer
	see paragraph 16 "OTHER INFORMATION"
Emergency phone numbers	see heading and/or footer
	see paragraph 16 "OTHER INFORMATION"

### 2 COMPOSITION/INFORMATION ON INGREDIENTS

Substance/Preparation	Substance.
Components/Impurities	Contains no other components or impurities which will influence the classification of the product.
CAS Nr	07727-37-9
EEC Nr (from EINECS)	231-783-9

### 3 HAZARDS IDENTIFICATION

Hazards identification	Refrigerated liquefied gas. Contact with product may cause cold burns or frostbite. In high concentrations may cause asphyxiation.
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### 4 FIRST AID MEASURES

Inhalation	In high concentrations may cause asphyxiation. Symptoms may include loss of mobility/consciousness. Victim may not be aware of asphyxiation. Remove victim to uncontaminated area wearing self contained breathing apparatus. Keep victim warm and rested. Call a doctor. Apply artificial respiration if breathing stopped.
Skin/eye contact	Immediately flush eyes thoroughly with water for at least 15 minutes. In case of frostbite spray with water for at least 15 minutes. Apply a sterile dressing.
Ingestion	Obtain medical assistance Ingestion is not considered a potential route of exposure.

### 5 FIRE FIGHTING MEASURES

Specific hazards	Exposure to fire may cause containers to rupture/explode. Non flammable
Hazardous combustion products	None
Suitable extinguishing media	All known extinguishants can be used.

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## Safety Data Sheet

Product :

Nitrogen (refrigerated)

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MSDS Nr : 089B\_AL

Version : 1.01

Date : 31/07/2002

Specific methods

If possible, stop flow of product.

Move away from the container and cool with water from a protected position.

If leaking do not spray water onto container. Water surrounding area (from protected position) to contain fire.

Special protective equipment for fire fighters

In confined space use self-contained breathing apparatus.

## 6 ACCIDENTAL RELEASE MEASURES

Personal precautions

Evacuate area.

Use protective clothing.

Wear self-contained breathing apparatus when entering area unless atmosphere is proved to be safe.

Ensure adequate air ventilation.

Environmental precautions

Try to stop release.

Prevent from entering sewers, basements and workpits, or any place where its accumulation can be dangerous.

Clean up methods

Ventilate area.

## 7 HANDLING AND STORAGE

Handling and storage

Suck back of water into the container must be prevented.

Do not allow backfeed into the container.

Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Contact your gas supplier if in doubt.

Refer to supplier's container handling instructions.

Keep container below 50°C in a well ventilated place.

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Personal protection

Ensure adequate ventilation.

Protect eyes, face and skin from liquid splashes.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

Molecular weight

28

Melting point

-210 °C

Boiling point

-196 °C

Critical temperature

-147 °C

Relative density, gas

0.97 (air=1)

Relative density, liquid

0.8 (water=1)

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## Safety Data Sheet

**Product :****Nitrogen (refrigerated)**

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Vapour Pressure 20°C

Not applicable.

Solubility mg/l water

20 mg/l

Appearance/Colour

Colourless liquid

Odour

No odour warning properties.

Other data

Gas/vapour heavier than air. May accumulate in confined spaces, particularly at or below ground level.

### 10 STABILITY AND REACTIVITY

Stability and reactivity

Stable under normal conditions.

Liquid spillages can cause embrittlement of structural materials.

### 11 TOXICOLOGICAL INFORMATION

General

No known toxicological effects from this product.

### 12 ECOLOGICAL INFORMATION

General

Can cause frost damage to vegetation.

### 13 DISPOSAL CONSIDERATIONS

General

Do not discharge into any place where its accumulation could be dangerous.

Contact supplier if guidance is required.

### 14 TRANSPORT INFORMATION

Proper shipping name

Nitrogen, refrigerated liquid

UN Nr

1977

Class/Div

2.2

ADR/RID Classification code

2, 3°A

ADR/RID Hazard Nr

22

Labelling ADR

Label 2: non flammable non toxic gas

Other transport information

Avoid transport on vehicles where the load space is not separated from the driver's compartment.

Ensure vehicle driver is aware of the potential hazards of the load and knows what to do in the event of an accident or an emergency.

Before transporting product containers ensure that they are firmly secured and:

- there is adequate ventilation.

- compliance with applicable regulations.

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## Safety Data Sheet

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**Product :** Nitrogen (refrigerated)

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Version : 1.01

Date : 31/07/2002

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### 15 REGULATORY INFORMATION

Number in Annex I of Dir 67/548

Not included in Annex I.

EC Classification

Not classified as dangerous preparation.

EC Labelling (Symbols, R&S phrases)

No EC labelling required.

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### 16 OTHER INFORMATION

May cause frostbite.

Asphyxiant in high concentrations.

Keep container in well ventilated place.

Do not breathe the gas.

Ensure all national/local regulations are observed.

The hazard of asphyxiation is often overlooked and must be stressed during operator training.

Before using this product in any new process or experiment, a thorough material compatibility and safety study should be carried out.

Details given in this document are believed to be correct at the time of going to press. Whilst proper care has been taken in the preparation of this document, no liability for injury or damage resulting from its use can be accepted.

This Safety Data Sheet has been established in accordance with the applicable European Directives and applies to all countries that have translated the Directives in their national laws.

This MSDS is for information purposes only and is subject to change without notice. [Prior to purchase of products, please contact your local Air Liquide office for a complete MSDS (with Manufacturer's name and emergency phone number).]

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**End of document.**

**Number of pages :4**

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**3.5 Accident Leaflet  
„suffocating Gases”****ACCIDENT LEAFLET FOR ROAD TRANSPORTATION  
ADR/GGVS Class 2  
CRYOGENIC LIQUEFIED GASES: suffocating**

non-toxic, non-caustic, non-inflammable, non-oxidizing –  
designation of the medium is indicated on the next page

**HAZARDS**

Heating results in pressure increase – danger of bursting.  
Gas is having a suffocating effect without any observable symptoms.  
The leaked liquid is very cold and evaporates rapidly.  
Liquid causes heavy injuries through frostbite on skin and eyes.  
Together with humid air, it generates fog.  
Gas is heavier than air and spreads on the ground.

**PROTECTIVE EQUIPMENT**

Safety glasses, protective gloves or face protection,  
protective shoes

**EMERGENCY MEASURES: IMMEDIATELY NOTIFY FIRE  
BRIGADE AND POLICE**

Stop the motor.  
Secure the road and warn other road users.  
Keep unauthorized persons away from the danger zone.  
Stay on wind side.

**LEAKAGE LOSSES**

If possible, remove leakage losses.  
Consult an expert.  
Have leaked liquid evaporated.  
Warn everyone - danger of suffocating existing in sewerage,  
cellars and pits.

**FIRE:**

In case of fire conditions, cool the tank by means of a water  
spray jet.

**FIRST AID:**

Thaw frozen garments and remove them carefully.  
Medical aid is required in case of frostbite symptoms.

**ONLY VALID FOR ROAD TRANSPORTATION** Dez 96

### 3.6 Labelling

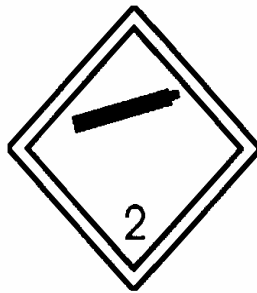
The tanks have to be labelled according to the regulations for hazardous goods for the respective employment.

#### **Cryogenic liquefied Gases**

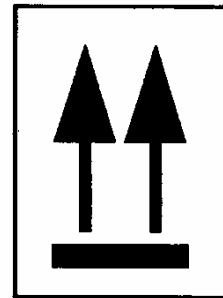
suffocating, Class 2 Figure and Group 3A

Figure and Group	Number, Labelling, Designation of the Medium
3A	1977 nitrogen, cryogenic liquid 1951 argon, cryogenic liquid

#### **Caution Marks**



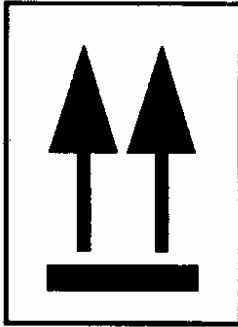
**No. 2**  
Non-combustible  
and non-toxic  
gas;



**No. 11**  
**This side up;**  
This label has to  
be attached with  
the arrow heads  
pointing  
upwards.

## **4 Transportation and Assembly**

### **4.1 General Transportation**



#### **Transportation of the Vessel**

- Observe safety instructions.
- Keep upright.
- Lift and set down carefully.
- Avoid impacts and strong shocks

#### **Transportation in filled condition**

- The vessel must be in excellent condition.
- The vessel must be in unpressurized condition with loosely fitted transport stopper.
- The EK Siphon has to be dismantled.
- Use 2 person for transport over inclines, pitches and steps



**Observe the national regulations during internal and road transportation with vehicles. At the same time, protect the vessel from tumbling down, shifting and damage (by stowing / lashing).**

### **4.2 Assembly**



#### **Assembly of the Vessel**

- Observe safety instructions.
- Ensure good ventilation.
- Consider place of operation
- Fix castors by means of the locking levers.

## 5 Operation

### 5.1 Initial Commissioning

The vessel can be commissioned immediately after delivery.



#### Caution !

- Observe safety instructions.
- Use filling line with safety valve and pressure relief.
- Wear gloves and safety glasses.
- Protect the vessel from rolling away, tumbling down and damage.



#### Note !

- When cooling down the hot vessel to operating temperature, increased evaporation losses do occur.

### 5.2 Assembly and Disassembly of the EK Siphon

In principle, operate the vessel exclusively by means of the EK Siphon (2).



**When opening the waste gas/overflow valve (1), make sure that it is not directed towards any persons or devices; cryogenic gas will cause burns and brittleness.**



#### Note !

- Due to operation, open valves will get covered by ice during the pressure build-up, waste gas/overflow and filling/withdrawal.
- Closed valves will thaw eventually.
- Lasting frost formation indicates leakage.



#### Assembly of the EK Siphon

1. Clean and remove ice from the sealing surfaces (4), centering ring (5) and O-ring (6) **and replace if damaged**.
2. Place the centering ring (5) with O-ring (6) on the flange.
3. Close the filling/withdrawal valve (3) at the EK Siphon.
4. Open the waste gas/overflow valve (1) for avoiding pressure increase.
5. Insert the EK Siphon (2) vertically into the neck.
6. Place the straining ring (9) and tighten the wing screw (8).
7. Close the waste gas/overflow valve (1).



**Liquid nitrogen may escape from the waste gas/overflow valve when the EK Siphon is immersed.**

### Disassembly of the EK Siphon

**Danger of Accidents!**

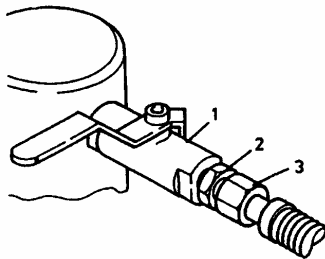
**Dismantle the EK Siphon only with unpressurized vessel.**

1. Close the pressure build-up valve (7).
2. Close the filling/withdrawal valve (3).
3. Detach the connected withdrawal line from the EK Siphon.
4. Open the waste gas/overflow (1) valve for relieving the pressure of the vessel.
5. Loosen the wing screw (8) and remove the straining ring (9) from the unpressurized tank.
6. Remove the EK Siphon (2) by pulling it out carefully from the top and deposit it carefully.
7. Loosely insert the transport stopper.

### 5.3 Assembly of the Transfer Hose

**Note**

- Avoid any heavy mechanical strain.
- Do not carry out any assembly and disassembly while the vessel is cold.



### Assembly of the Transfer Hose

1. Screw the union nut (3) onto the connecting screwing (2) of the filling/withdrawal valve (1).
2. Tighten the union nut (3) by means of an open-jawed wrench; in doing so retain the hexagon (2) with a wrench.
3. If necessary, tighten the union nut (3) in cold condition.

### 5.4 Filling of the Vessel

**Caution !**

- Observe safety instructions.
- Use filling line with safety valve and pressure relief.
- Wear gloves and safety glasses.
- Protect the vessel from rolling away, tumbling down and damage.
- The pressure in the supply – vessel must not be higher than 1,3 bar

**Note !**

- Additional aggregates for filling and withdrawal have to be adapted to the operating conditions of the vessel.
- Filling has to take place outside or in a sufficient ventilated room

**Risk of suffocation**

**Filling**

1. Mount the EK Siphon.
2. Connect the filling line from the tank to the filling/withdrawal valve.
3. Open the waste gas/overflow valve for causing pressure relief.
4. Open the filling/withdrawal valve at the EK Siphon.
5. Open the tank valve for filling the vessel.
6. Close the tank valve when liquid nitrogen escapes from the waste gas/overflow valve .



**Caution!**  
**Risk of skin burns**

**After completion of filling:**

**Waste Gas/Overflow Valve (3) to leave open.**

1. Close the filling/withdrawal valve (1) at the EK Siphon.
2. Relief pressure from the filling line (2).
3. Loosen the filling line (2).
4. Dismantle the EK Siphon.
5. Move the tank (with the transport stopper loosely inserted) to its destination.
6. Remove the transport stopper.
7. Mount the EK Siphon.



**Risk of skin burns by escaping nitrogen**

**Filling without EK-Siphon in open condition**

Alternatively to the procedure described above the vessel may be filled by a hose with phase separator in open condition. The filling has to be stopped prior the liquid level reaches the neck tube.

1. depressurise and unmount the EK-siphon
2. let liquid inflow trough the neck tube in open condition
3. stop filling procedure prior liquid level reach the neck tube (liquid level gauge 5% under max-indicator)
4. mount the EK siphon (ball valves 1 + 2 closed)
5. open overflow valve 3: overfilled liquid will escape



**Caution!**  
**Risk of skin burns by escaping nitrogen**



**5.5 Withdrawal of liquid Nitrogen****Withdrawal**

1. Move the vessel to the place of withdrawal.
2. Mount the EK Siphon.
3. Mount the delivered transfer hose or a relevant filling line.
4. Open the filling/withdrawal valve in order to withdraw liquid nitrogen.
5. Adjust the desired withdrawal pressure and open the pressure build-up valve for this purpose.

**Caution !**

- Observe safety instructions.
- Wear gloves and safety glasses.
- Protect the vessel from rolling away, tumbling down and damage.

## 5.6 Pressure Build-up

The operating pressure in the vessel allows for withdrawing the liquid gas.

<b>Vessel name</b>		<b>Apollo®</b>
maximum operating pressure		1,3 bar

The safety valve limits the maximum operating pressure. Should the pressure in the tank not be sufficient for the withdrawal operation, it can be increased by opening the pressure build-up valve.



### Prior to pressure build-up:

- Check the EK Siphon for tight seat.
- Adjust the operating pressure only as high as required.

### Pressure Build-up

1. Close the waste gas/overflow valve.
2. Close the filling/withdrawal valve.
3. Slowly open the pressure build-up valve.
4. Watch the pressure gauge.
5. Close pressure build-up valve when the desired pressure is reached.

### Continuous Withdrawal under constant Pressure

1. Slightly open the pressure build-up valve.
2. Close the pressure build-up valve when the desired pressure is reached.
3. When starting with the withdrawal, watch the pressure drop at the pressure gauge.
4. Open the pressure build-up valve in such a way that the desired pressure remains constant.



### Note

- Avoid blowing-off of the safety valve.
- Frost formation on the vessel bottom is operational.



### Close the pressure build-up valve prior to finishing the withdrawal process.

A pressure control valve is recommended for continuous withdrawal. This item has to be indicated separately on the purchase order. Retrofitting is possible.

## 5.7 Pressure Relief

Open the waste gas/overflow valve, until the operating pressure at the pressure gauge will be achieved. Subsequently, close the valve again.



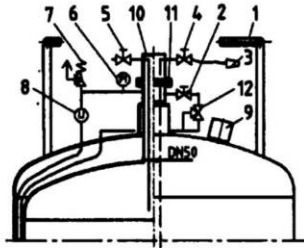
**Do not direct the opening of the waste gas/overflow valve towards any persons or devices, as cryogenic gas causes burns and brittleness.**

## 5.8 Putting out of Operation

When putting the vessel out of operation, it has to be completely emptied out, warmed up and stored under slight gas overpressure, in order to avoid condensation of humidity.

## 5.9 Operating Instructions

**OPERATING INSTRUCTIONS  
APOLLO / SATURN**



<p>1 Valve Protection</p> <p>2 Pressure build-up valve</p> <p>3 Transfer hose with phase separator</p> <p>4 Filling/withdrawal valve</p> <p>5 Waste gas/overflow valve</p> <p>6 Pressure indicator</p> <p>7 Safety valve</p>	<p>8 Level indicator</p> <p>9 Positive pressure relief and seal-off device</p> <p>10 EK Siphon</p> <p>11 Eccentric and straining ring</p> <p>12 Pressure raising control valve, optional</p>
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**1. Safety**

- Observe Leaflet "How to handle Nitrogen"
- Operation only by persons instructed correspondingly (TRB 700)
- Loosen eccentric & straining ring (Item 11) only with unpressurized vessel
- When setting up in rooms, ensure good ventilation (TRB 610)

**2. Filling the vessel**

- Valve (2) closed
- Connect filling line (3) to filling valve (4)
- Open waste gas/overflow valve (5)
- Open filling/withdrawal valve (4)
- Stop filling, when liquid escapes from the waste gas/overflow valve (5)
- Close filling/withdrawal valve (4)

**3. Withdrawing the liquid**

- Connect transfer hose (3) with phase separator to valve (4)
- Open withdrawal valve (4)
- Close valve (4) after withdrawal of liquid

**4. Pressure build-up**

- Open pressure build-up valve (2) until the desired operating pressure is achieved
- During withdrawal, adjust setting of Valve 2

**5. Pressure Relief**

- Close pressure build-up valve (2)
- Open waste gas/overflow valve (5)

**6. Transportation**

APOLLO - in unpressurized condition with loosely fitted transport stopper

SATURN - unpressurized, 1 bar maximum

- Valves 2, 4, 5 closed
- keep upright
- avoid impacts and shocks
- during transportation, protect from tumbling down, rolling away and damage

**Cryotherm**  
794.23046 E



### **Note !**

The operating instructions

- are firmly attached to the outer vessel.

**6 Maintenance / Repair**

- With conventional use, the vessel does not require any special maintenance or attendance.
- Regular examinations with regard to operativeness and tightness of the fittings and screwings are recommended.
- Every two years, the safety valves have to be examined with regard to function and set pressure. The pressure gauge indicates the set pressure.
- With conventional use, the vessel does not require any special maintenance or attendance.
- Regular examinations with regard to operativeness and tightness of the fittings and screwings are recommended.
- Every two years, the safety valves have to be examined with regard to function and set pressure. The pressure gauge indicates the set pressure.

**7 Faults****7.1 General Faults**

**Immediately put the vessel out of operation, in case that**

- the fittings are leaky.
- the safety valve does blow off intensively.
- the rate of evaporation is too high.
- The outer cylinder is thawed / iced-up, which indicates loss of vacuum.



**In case of nitrogen escaping,**

- there exists the danger of suffocation.
- open windows and doors.
- leave closed rooms.



**Vessels with vacuum loss are useless and have to be returned to the manufacturer for examination / repair.**

**In case of any queries, please indicate**

- type of vessel
- maker's number
- year of construction

**7.2 Possible Faults**

<b>Fault</b>	<b>Cause</b>	<b>Trouble shooting</b>
Iced-up valve	<p>This is operational with opened valve.</p> <p>The valve is not closed completely.</p> <p>The valve is leaky.</p>	<p>-</p> <p>Close the valve (it thaws).</p> <p>Tighten the screwings / seat. If required, rinse / exchange the valve.</p>
Safety valve blows off.	<p>Pressure build-up valve is open.</p> <p>Pressure raising controller is too highly adjusted.</p> <p>Filling pressure is too high.</p> <p>Pressure build-up valve is open</p> <p>Level indicator is defective.</p>	<p>Close pressure build-up valve.</p> <p>Lower adjust the opening pressure of the pressure raising controller.</p> <p>Decrease the filling pressure of the withdrawal tank.</p> <p>Open waste gas overflow valve.</p> <p>Close shut-off valves of the level indicator, exchange level indicator.</p>
<p>Frost formation on the vessel</p> <ul style="list-style-type: none"> <li>• at the outer vessel</li> <li>• at the bottom</li> </ul>	<p>Vacuum loss</p> <p>Operational pressure build-up</p>	<p>Examination / re-evacuation by the manufacturer</p> <p>-</p>
Positive pressure relief and seal-off device released, vessel extremely iced-up	Vacuum loss within the vacuum room	<p>Empty out the vessel / put it out of operation</p> <p>Examination / repair at the manufacturer's works</p>

**8 Warranty**

Our warranty requires the proper use of the device according to the regulations. When exchanging parts, only original spare parts have to be used. Wear parts are not subject to warranty.

Extent and duration of our warranty comply with the regulation indicated in our terms of delivery.





**Behälter nach Richtlinie 97/ 23/ EG**  
**Vessel acc.to European Directive 97/23/EC**

**Cryotherm**

Kategorie  
category **I**

Typ  
type **APOLLO® 50 - 1,3 bar**

Herstell - Nr.  
fabr.no.

Baujahr  
year of construction

Leergewicht  
empty weight  kg

**CE**

zul. Betriebsüberdruck working pressure	<b>1,3 bar</b>	Innenbehälter inner vessel	<b>-1 bar</b>
tiefste Betriebstemp. working temperature	<b>-196 °C</b>	Außenbehälter outer vessel	<b>+20 °C</b>
Fluid	<b>LIN</b>		
Inhalt volume	<b>50 l</b>		

**Made in Germany** Cryotherm GmbH & Co. KG 57548 Kirchen (Sieg)

**Behälter nach Richtlinie 97/ 23/ EG**  
**Vessel acc.to European Directive 97/23/EC**

**Cryotherm**

Kategorie  
category **I**

Typ  
type **APOLLO® 100 - 1,3 bar**

Herstell - Nr.  
fabr.no.

Baujahr  
year of construction

Leergewicht  
empty weight  kg

**CE**

zul. Betriebsüberdruck working pressure	<b>1,3 bar</b>	Innenbehälter inner vessel	<b>-1 bar</b>
tiefste Betriebstemp. working temperature	<b>-196 °C</b>	Außenbehälter outer vessel	<b>+20 °C</b>
Fluid	<b>LIN</b>		
Inhalt volume	<b>100 l</b>		

**Made in Germany** Cryotherm GmbH & Co. KG 57548 Kirchen (Sieg)

**Behälter nach Richtlinie 97/ 23/ EG**  
**Vessel acc.to European Directive 97/23/EC**

**Cryotherm**

Kategorie  
category **I**

Typ  
type **APOLLO® 150 - 1,3 bar**

Herstell - Nr.  
fabr.no.

Baujahr  
year of construction

Leergewicht  
empty weight  kg

**CE**

zul. Betriebsüberdruck working pressure	<b>1,3 bar</b>	Innenbehälter inner vessel	<b>-1 bar</b>
tiefste Betriebstemp. working temperature	<b>-196 °C</b>	Außenbehälter outer vessel	<b>+20 °C</b>
Fluid	<b>LIN</b>		
Inhalt volume	<b>150 l</b>		

**Made in Germany** Cryotherm GmbH & Co. KG 57548 Kirchen (Sieg)

**Cryotherm**



**ZERTIFIKAT / CERTIFICATE**  
**Konformitätserklärung / Declaration of Conformity**  
nach Richtlinie 97/23/EG / acc. to Directive 97/23/EC

Name und Anschrift des Herstellers:  
Name and adress of Manufacturer:  
CRYOTHERM GMBH & CO.KG  
Euteneuen 4  
57548 Kirchen ( Sieg )

Zertifiziert durch/  
Certified by:  
TÜV Anlagentechnik GmbH  
Am Grauen Stein  
51105 Köln

Hiermit wird bescheinigt, daß die Ergebnisse, der an der unten genannten Baugruppe von Druckgeräten vorgenommenen Prüfungen, die Anforderungen der Richtlinie 97/23/EG erfüllen. Das Typenschild ist mit dem abgebildeten Zeichen gekennzeichnet:  
With this declaration we certify that the results of the examinations carried out at the assembly of pressure devices mentioned below, the requirements of Directive 97/23/EC  
The name plate is marked with the depicted sign.



Geprüft nach Richtlinie 97/23/EG  
Examined acc. to Directive 97/23/EC

Kategorie / Category:	I
Angewandte techn. Spezifikationen: Applied technical specifications:	AD 2000-Merkblätter
Modul / Module:	A
Beschreibung der Baugruppe: Description of the assembly:	APOLLO® (betriebsbereit ausgerüstet / compl. equipped)
Verwendungszweck: Description of pressure equipment:	LIN Lagerbehälter LIN Storage vessel
Herstellnummer: Manufacturing no.:	
Baujahr : Year of construction:	

Kirchen,

Cryotherm GmbH & Co. KG

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Qualitätsmanagement / Quality management



Liste der Druckgeräte und Ausrüstung									
List of pressure device and equipment									
Druckgeräte der Baugruppe Assembly of pressure device	Herstell- nummer Manufacturing no.	PS [bar]	TS [°C]	V [L]	Fluid	Fluidgruppe Fluids group	Kategorie Category	Modul Module	Kennzeichnung Labeling
APOLLO®		1,3	-196		LIN	2	I	A	CE
Sicherheitsventil 06002		1,3	-196	-	LIN	2	IV	B+D	CE 0045

Ausrüstungsteile gem. Art.3, Abs.3 der Richtlinie 97/23/EG  
equipment accessories according to Art.3, Abs.3 directive 97/23/EC

☐ EK Heber  
withdrawal head

☐ Druckregler  
pressure regulator

☐ Füllstandsanzeige  
level gauge

☐ Doppelentnahme  
dual withdrawal

☐ Manometer  
pressure gauge

☐ Dreifachentnahme  
triple withdrawal

Sonderausstattung:  
special equipment

Für die Aufstellung, Inbetriebnahme und den Betrieb des Behälters sind die nationalen Verordnungen, bei Aufstellungsort Deutschland zusätzlich die Betriebssicherheitsverordnung (BetrSichV) einzuhalten.

For set up, start up and operation of the vessel the national regulations are to be used. For vessels placed in Germany additional the Betriebssicherheitsverordnung (BetrSichV) has to be applied.